Algebra II #19   Kay   Name_____

Write a function for each and solve.

1. The first US census was conducted in 1790. At that time the population was 3,929,214. Since then the US population has grown by approximately 2.03% annually. Write the function to represent the US Population, then estimate the population in 2015.	2. A cup of green tea contains 35 milligrams of caffeine. The average teen can eliminate approximately 12.5% of the caffeine from their system per hour. Write the function to represent the amount of caffeine, then estimate the amount of caffeine in a teenager's body 3 hours after drinking a cup of green tea. $X=3$
$y = 3,929,214 (1.0203)^x$ $X = 2015$ -1790 $\overline{225}$ 361,476,592	$y = 35(.875)^x$ 23.45 mg
3. The half-life of radon occurs every 15 minutes. A lab has a sample weighing 64 grams. How much radon will be present in 4 hours? $4 \times 60 = 240$ min $y = 64(.5)^{\frac{240}{15}}$ .00097656	4. A nest of mice quadruples in size every month. If the nest starts with 2 mice, how many mice will there be in 1 year (assume all the mice live long happy lives.) $y = 2(4)^{12}$ 33554432

Given $f(x)$, find the equation of its inverse, $f^{-1}(x)$.

5. $f(x) = \frac{1}{15}x + 12$ $X = \frac{1}{15}y + 12$ $(15) X - 12 = \frac{1}{15}Y \ (15)$ $\boxed{Y^{-1} = 15X - 180}$	6. $f(x) = -\frac{1}{3}x + 2$ $X = -\frac{1}{3}Y + 2$ $(-3) X - 2 = -\frac{1}{3}Y \ (-3)$ $\boxed{Y^{-1} = -3X + 6}$
7. $f(x) = (x-4)^2 - 6$ $X = (y-4)^2 - 6$ $X + 6 = (y-4)^2$ $\pm\sqrt{X+6} = y - 4$ $\boxed{Y^{-1} = 4 \pm \sqrt{X+6}}$	8. $f(x) = \sqrt{x-3}$ $X = \sqrt{Y-3}$ $X^2 = y - 3$ $\boxed{Y^{-1} = X^2 + 3}$

Solve Each Equation:

9. $2^x = 8$ $2^x = 2^3$ $X = 3$	10. $2^x = 8^3$ $2^x = 2^{3 \cdot 3}$ $2^x = 2^9$ $X = 9$	11. $6^{2x} = 6^{10}$ $2x = 10$ $X = 5$
12. $9^{2x-1} = 3^{6x}$ $3^{2(2x-1)} = 3^{6x}$ $4x - 2 = 6x$ $\frac{-2}{2} = \frac{2x}{2}$ $\boxed{-1 = X}$	13. $2^{4n-2} = 64$ $2^{4n-2} = 2^6$ $4n - 2 = 6$ $4n = 8$ $n = 2$	14. $5^{5x} = 125^{x+2}$ $5^{5x} = 5^{3(x+2)}$ $5x = 3x + 6$ $2x = 6$ $x = 3$

Write in log form:

15. $x^{2.5} = 32$	16. $6^x = 216$	17. $1.2^0 = 1$	18. $4^{-1} = .25$
$\log_x 32 = 2.5$	$\log_6 216 = x$	$\log_{1.2} 1 = 0$	$\log_4 .25 = -1$

Write in exponential form:

19. $\log_5 625 = 4$	20. $\log_2 x = 6$	21. $\log_{4.5} 1 = 0$	22. $\log_\pi \pi = 1$
$5^4 = 625$	$2^6 = x$	$4.5^0 = 1$	$\pi^1 = \pi$

Use mental math (just your brain) to evaluate!!

23. $\log_2 1$	24. $\log 0.001$	25. $\log_4 64$	26. $\log_{0.1} 100$
0	-3	3	-2

Graph each function using the x-values. Give the Domain and Range. Then graph its inverse in a different color. Give the domain and range of the inverse.

27. $f(x) = (2)^x$

x	-2	-1	0	1	2	3
y	.25	.5	1	2	4	8

Domain: $\mathbb{R}$ Range: $y > 0$

$f^{-1}(x) = \log_2 x$

x	.25	.5	1	2	4	8
y	-2	-1	0	1	2	3

Domain: $x > 0$ Range: $\mathbb{R}$